

1 A Treatment Composition

2

3 Technical Field

4

5 The invention relates to a treatment composition for
6 treating a surface. In particular, the invention
7 relates to a composition for treating teeth and
8 household cleaning surfaces.

9

10 Background

11

12 A great many toothpaste compositions have been
13 developed and marketed for several years now.

14

15 It is known that toothpaste formulations may contain
16 various components, in particular water, a wetting
17 agent (for example glycerol, sorbitol, xylitol or
18 polyethylene glycol, etc.), a thickener (for
19 example xanthan gum), a source of flouride (usually
20 sodium fluoride or sodium monofluorophosphate (anti-

1 tooth-decay), a colorant, a flavouring, a sweetener,
2 a fragrance, a preserving agent, a surfactant and/or
3 additive, etc.

4

5 They generally also contain an abrasive agent which
6 must, by its mechanical action, remove dental plaque
7 while at the same time not subjecting the teeth
8 themselves to unacceptable abrasion.

9

10 Among the abrasive agents usually employed, mention
11 may be made of sodium bicarbonates and calcium
12 phosphates, sodium metaphosphates, aluminas and, in
13 recent years, silicas.

14

15 However, the agents of the prior art, in particular
16 silica and alumina abrasive agents in toothpaste
17 compositions, are not always of desirable refractive
18 index or porosity.

19

20 It is an object of the invention to overcome at
21 least some of the above disadvantages.

22

23 Statements of Invention

24

25 According to the invention, there is provided a
26 treatment composition which comprises a particulate
27 erasing agent, the particles of the erasing agent
28 being dimensioned to roll along a surface. In one
29 embodiment, the treatment composition is a personal
30 care treatment composition, such as, for example, a
31 dental care treatment composition. Other types of

1 personal care treatments include skin exfoliation
2 and personal washing.

3
4 In this specification, the term "particulate erasing
5 agent" should be understood as referring to a
6 multiplicity of relatively soft particles which are
7 dimensioned to be rolled along a surface and which,
8 during such a rolling action, pick up debris,
9 stains, plaque, tartar or the like from the surface,
10 especially dental and gum surfaces, in a manner
11 similar to which an eraser rubs pencil markings off
12 a page.

13
14 In a particularly preferred embodiment of the
15 invention, the dental treatment composition
16 comprises a toothpaste or a toothgel. Typically, the
17 particulate erasing agent comprises between 20% and
18 40% of the toothpaste or toothgel composition. In an
19 alternative embodiment, the dental treatment
20 composition comprises particulate erasing agent in a
21 powder form, along with instructions explaining how
22 the composition is administered to the teeth.

23
24 The invention also relates to the use of a
25 particulate erasing agent in a dental treatment
26 composition, wherein the particles of the erasing
27 agent are dimensioned to roll along a surface.

28
29 The invention also relates to a method of treating
30 teeth comprising the steps of:

1 applying a suitable amount of a dental treatment
2 composition according to the invention onto a
3 suitable applicator for the composition;
4 using the applicator to rub the composition onto a
5 surface of the teeth such that at least some of the
6 particles of the erasing agent roll along at least a
7 portion of the teeth; and
8 optionally rinsing the composition off the teeth.

9
10 Typically, the applicator is a toothbrush,
11 interdental brush, or soft rubber cup. When the
12 applicator is a brush, it may be manually,
13 mechanically or electrically operated.

14
15 The invention also relates to the use of the process
16 of the invention in one or more dental applications
17 selected from the group comprising: teeth brushing;
18 teeth whitening; teeth cleaning; plaque and tartar
19 removal; and general cleaning or polishing of the
20 teeth. In this specification, the term teeth should
21 be taken to include gums and mucous membranes of the
22 buccal cavity, and prosthetic parts such as crowns,
23 bridges and complete or partial dentures. As such,
24 the process may involve either blast application
25 using some form of particle accelerator, or manual
26 application, of the treating agent. Manual
27 application includes conventional brushing, rubbing,
28 polishing or the like.

29
30 The invention also relates to the use of the process
31 of the invention in treating bone or in skin
32 exfoliation treatment.

1
2 In another embodiment, the treatment composition is
3 a household care treatment composition. Thus, for
4 example, the treatment composition may be a hard
5 surface cleaner which may take the form of a
6 particulate solid, a gel or a fluid such as a cream.
7 In one embodiment, the hard surface treatment
8 composition is suitable for use in cleaning surfaces
9 such as baths, showers, sinks, tiled surfaces and
10 the like. In another embodiment, the hard surface
11 treatment composition is suitable for cleaning
12 kitchen utensils such as pots, pans and other
13 cooking and eating utensils. In another embodiment,
14 the hard surface treatment composition is suitable
15 for cleaning and/or polishing brassware, silverware
16 and other metallic objects.

17
18 The invention also relates to a method of treating a
19 hard surface comprising the steps of:
20 applying a suitable amount of a hard surface
21 treatment composition according to the invention
22 onto a suitable applicator for the composition;
23 using the applicator to rub the composition onto a
24 hard surface such that at least some of the
25 particles of the erasing agent roll along at least a
26 portion of the hard surface; and
27 optionally rinsing the composition off the hard
28 surface.

29
30 The invention also relates to a method of
31 exfoliating skin comprising the steps of:

1 applying a suitable amount of an exfoliating
2 treatment composition according to the invention
3 onto a suitable applicator for the composition;
4 using the applicator to rub the composition onto
5 skin such that at least some of the particles of the
6 erasing agent roll along at least a portion of the
7 skin; and optionally rinsing the composition off the
8 skin.

9
10 In one preferred embodiment, exfoliating treatment
11 composition is applied by hand and in such cases the
12 applicator may be a users hand. Otherwise, a
13 particle accelerator may be used to apply the
14 composition.

15
16 The invention also relates to the use of
17 precipitated or aggregated alkali metal carbonate as
18 an erasing agent in personal and household care
19 treatment compositions, especially personal and
20 household care cleaning compositions.

21
22 The invention also relates to the use of
23 precipitated or aggregated alkali metal carbonate in
24 dental treatments, personal washing, skin
25 exfoliating, and household cleaning, compositions.

26
27 Typically, the precipitated or aggregated alkali
28 metal carbonate is precipitated or aggregated
29 calcium carbonate (PCC). Typically, the PCC has an
30 average particle size between 30 and 1000 microns.
31 Preferably, the PCC has an average particle size
32 between 30 and 500 microns, more preferably between

1 30 and 100 microns. Typically, the PCC has an
2 average particle size between 70 and 90 microns.
3 Suitably, the PCC has an average particle size which
4 is preferably more than 50 microns, particularly
5 when it is used for dental treatment. Methods of
6 sizing the particles will be well known to those
7 skilled in the art. For example, vibrating sieves
8 may be employed to separate out particles within a
9 given range, for example, 70 to 90 microns.

10

11 In one embodiment of the invention, the dental
12 treatment composition comprises at least 3% water
13 (W/W), generally at least 5% water (W/W).

14

15 Preferably, the particles of the erasing agent
16 comprise a precipitate or aggregate of an insoluble
17 alkali metal salt. Typically, the salt is a
18 carbonate. Suitably, the alkali earth metal is
19 calcium. Most preferably, the particles of the
20 erasing agent comprise a precipitate or aggregate of
21 insoluble calcium carbonate. Typically, the
22 precipitate or aggregate of insoluble calcium
23 carbonate is obtained by a nitric acid method or a
24 calcium oxide method. In one preferred embodiment,
25 the particles of the erasing agent comprise an
26 aggregate of calcite crystals formed into a round
27 shape during crystallisation.

28

29 Preferably, the particles are generally round. In
30 this specification the term "generally round" as
31 applied to particles should be understood to mean
32 any shape which of particle which enables the

1 particle to easily assume a rolling motion when
2 moved along a surface. As such, while the term is
3 primarily intended to refer to spherical particles,
4 in one aspect it is not intended to exclude other
5 types of spheroids such as spheres having an oblong
6 or elliptical shape. Ideally, the particles are
7 round. Typically, the particles will have an
8 irregular surface configuration.

9
10 Ideally, the particles are relatively soft.
11 Generally, the particles have an average hardness of
12 less than 10 Mohs, typically less than 8 Mohs, and
13 preferably less than 6 Mohs. Typically, the
14 particles will have an average hardness of at least
15 1 Mohs, and preferably of at least 2 Mohs. In a
16 preferred embodiment of the invention, the particles
17 will have an average hardness of about 3 Mohs.
18 Typically, the particles have an average maximum
19 diameter of between 30 and 1000 microns. Suitable
20 methods of measuring Mohs hardness will be well
21 known to those skilled in the field.

22
23 In one embodiment of the invention, the particles
24 have an average maximum diameter of between 30 and
25 1000 microns, preferably between 60 and 120 microns,
26 and most preferably between 70 and 80 microns.

27
28 Typically, the particulate erasing agent comprises
29 between 1 and 75% of the total composition (W/W).
30 Preferably, the particulate erasing agent comprises
31 between 20 and 40%, most preferably between 25 and
32 35%, of the total composition (W/W).

1

2 In one embodiment of the invention, the dental
3 treatment composition comprises a paste or a gel.
4 Preferably, the dental treatment composition is a
5 toothpaste. Alternatively, the dental treatment
6 composition may comprise a teeth whitening
7 composition, a plaque removal composition, a
8 toothgel, a polishing paste, or the like.

9

10 In one embodiment of the invention, the dental
11 treatment composition comprises a powder which,
12 optionally, is used as an additive in a further
13 component or components.

14

15 The invention also relates to the combination of a
16 dental treatment composition according to the
17 invention contained within a dispenser for the
18 composition. Typically, the dispenser comprises a
19 deformable tube. Other types of dental care
20 composition dispensers are also envisaged such as,
21 for example, piston pumps.

22

23 The invention also relates to a use of a particulate
24 erasing agent in a dental treatment composition,
25 wherein the particulate erasing agent comprises
26 particles which are dimensioned to roll along a
27 surface and which ideally have an average maximum
28 diameter of between 30 and 1000 microns.

29

30 The invention also relates to the use of an alkali
31 metal carbonate, typically precipitated or

1 aggregated alkali metal carbonate, as a liquid
2 hydrocarbon absorbing agent.

3

4 The invention also relates to a process for
5 absorbing liquid hydrocarbon comprising the steps of
6 bringing an alkali metal carbonate into contact with
7 the liquid hydrocarbon, allowing the alkali metal
8 carbonate absorb the liquid hydrocarbon, and
9 removing the alkali metal carbonate.

10

11 In this specification, the term "liquid hydrocarbon"
12 should be understood as including oil, petroleum and
13 diesel.

14

15 Suitably, the process and use is suitable for
16 cleaning up spilled oil.

17

18 Brief Description of the Drawings

19

20 The invention will be more clearly understood from
21 the following description of some embodiments
22 thereof, given by way of example only, with
23 reference to the following figures in which:

24

25 Fig 1 is an illustration of a particle of a treating
26 agent according to the invention; and

27

28 Fig 2 illustrates the process of the invention.

29

30 Detailed Description

31

1 Referring to the drawings, and initially to Fig 1,
2 there is illustrated a particle, indicated generally
3 by the reference numeral 1, which is used in the
4 process of the invention. The particle is a
5 particle of precipitated calcium carbonate and has a
6 generally round, and slightly irregular, shape and a
7 rough, irregular, surface configuration.

8
9 Referring to Fig 2, the process of the invention is
10 illustrated in which the particle 1 is rubbed along
11 a surface 2 of a tooth having a coating 3 of plaque
12 to be removed. Due to the nature and the round
13 shape of the particle 1, upon impact the particle 1
14 rolls along the surface, rubbing the surface and
15 absorbing the coating 3 onto a surface of the
16 particle. This has the net effect of removing the
17 coating from the surface without causing any damage
18 to the surface.

19

20 Example 1

21

22 Method of production of particulate erasing agent
23 (Calcium Oxide Method)

24

25 Production of insoluble calcium carbonate particles
26 is carried out by providing free Ca^{++} in a liquid
27 with a PH over 7 by dissolving calcium oxide in
28 water.

29

30 Addition of CO_2 results in the precipitation CaCO_3 .

31

32 $\text{Ca}^{++} + 2\text{OH}^- + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

1
2 Various other methods of production of particles
3 forming part of treating agents according to the
4 invention have been investigated using various types
5 of substrates including plastic, metal and polymer.
6 Examples of these methods include:

7

8 Chemical

9

10 There are numerous chemical methods for producing
11 particulate erasing agents. Generally, chemical
12 methods result in very fine powder particle sizes.
13 Such methods include Sol Gel, chemical
14 precipitation, Reaction, reduction (hydrogen in an
15 autoclave to reduce metal salts to the metal),
16 decomposition (eg metal carbonyls) and Electrolysis.

17

18 Example 2

19

20 One specific method includes the steps of dissolving
21 apatite in nitric acid (Nitric Acid Method). The
22 thus formed liquid is cooled to crystallise out
23 calcium nitrate. Calcium nitrate crystals are then
24 separated from the thus-formed slurry by
25 centrifugation or filtration. NH₃ and CO₂ is then
26 added to the calcium nitrate, resulting in
27 precipitation of CaCO₃ and ammonium nitrate liquid.
28 The precipitated CaCO₃ is then separated by
29 filtering.

30

31 Spray drying

32

1 This is the most widely used industrial process
2 involving particle formation and drying. It is
3 highly suited for the continuous production of dry
4 solids in either powder, granulate or agglomerate
5 form from liquid feedstocks as solutions, emulsions
6 and pumpable suspensions.

7

8 Aggregation

9

10 The most common method of aggregation is where the
11 constituents are physically mixed together with an
12 organic binder. The solvent is then driven off and
13 the resultant material sized. The binder should be
14 burnt off during spraying. This process is used in
15 the manufacture of NiAl, AlSi or polyester powders.
16 The most common method of agglomeration is where the
17 constituents are physically mixed together with an
18 organic binder. The solvent is then driven off and
19 the resultant material sized. The binder should be
20 burnt off during spraying. This process is used in
21 the manufacture of NiAl, AlSi-polyester powders.

22

23 The use of spray drying has become another common
24 method for the aggregation of powders. Here, a
25 slurry is formed with the constituents and this is
26 then fed into a rotary spray head. Here, the slurry
27 forms an atomised cloud which is solidified by an
28 opposing warm air stream to produce a powder. This
29 method is used for ceramics such as zirconia and
30 cermets such as WC-cobalt. The powder is largely
31 spherical but in the as spray dried state can be
32 porous and friable. The material is often densified

1 and stabilised by sintering and/or spray
2 densification.

3
4 There are also methods of mechanical aggregation (eg
5 the Hosakawa method) where for example a hard
6 constituent is mechanically driven into a softer
7 matrix particle to form a composite powder. Indeed,
8 simple ball grinding can be used to mechanically
9 alloy two or more constituents together.

10
11 Although sintering can be used as part of the spray
12 drying process it can also be used alone as a method
13 to manufacture powders. The constituents are mixed
14 together and heated to get some solid state
15 diffusion going and then the resultant product is
16 crushed. A number of repeated cycles can be used to
17 promote further alloying in which case the powder is
18 called a "reacted" powder.

19

20 Atomisation

21

22 There are a number of atomisation techniques which
23 all rely on the production of a molten pool as the
24 source. Atomisation methods include Rotating
25 Electrode, Vibrating Electrode (arc), Centrifugal
26 (from a melt) and Rapid Solidification (eg aluminium
27 ribbon). However, by far the most commonly used
28 methods are either water or gas atomisation.

29

30 Others

31

32 - Solid State Reduction

- 1 - Electrolysis
- 2 - Electrodeposition
- 3 Mechanical Comminution

4

5 The sources of commercially available precipitated
6 calcium carbonate, and one means of manufacture, are
7 listed in the paper entitled "Fine-Ground and
8 Precipitated Calcium Carbonate" by Larisa Gorbaty,
9 Andreas Leder and Yuka Yoshida, published in the
10 Chemical Economics Handbook (1996 - SRI
11 International).

12

13 Toothpaste Compositions

14

15 As described above, the dental treatment composition
16 of the invention may take the form of a toothpaste.
17 In this regard, particulate erasing agent
18 (precipitated calcium carbonate as formed in Example
19 2) may be added to a toothpaste composition in an
20 amount of 30 % of the toothpaste composition (w/w).
21 Prior to addition of the erasing agent it is sized
22 using vibrating sieves to ensure that the particles
23 have an average diameter of about 70 microns. Other
24 suitable sizing methods will be apparent to those
25 skilled in the art. Details of toothpaste
26 formulations will be well known to those skilled in
27 the field dental treatment compositions and will not
28 be described in any detail in this specification.

29

30 Personal Wash Compositions

31

1 The particulate erasing agent as produced in Example
2 2 (precipitated calcium carbonate) may be used in
3 the formulation of personal wash compositions such
4 as, for example, soap, shower gel, body wash, and
5 the like. The amount of particulate erasing agent
6 added to the compositions can be varied depending on
7 the type of product. Otherwise, the composition of
8 such personal wash composition will be known to
9 those skilled in the field of personal wash
10 formulation. Personal wash composition according to
11 the invention are particularly suitable for washing
12 oil and hydrocarbon-based soil from the skin and
13 from other objects.

14

15 Skin Exfoliating Compositions

16

17 The particulate erasing agent as produced in Example
18 2 (precipitated calcium carbonate) may be used in
19 the exfoliation of skin in compositions such as, for
20 example, soap, shower gel, body wash, and the like.
21 The amount of particulate erasing agent added to the
22 compositions can be varied depending on the type of
23 product. Otherwise, the composition of such skin
24 exfoliating compositions will be known to those
25 skilled in the field of personal wash formulation.
26 objects.

27

28 Household Care Composition

29

30 The formulation of household care composition,
31 including hard surface cleaners in the forms of
32 creams and particulate solids, will be well known to

1 those skilled in the field of household cleaning and
2 polishing composition formulation.

3
4 Liquid Hydrocarbon Absorbing

5
6 Precipitated calcium carbonate (PCC) having a
7 particle size of about 70 microns (as prepared
8 above) is used to remove oil spilled on the ground.
9 The PCC is poured onto the oil in an amount
10 sufficient to cover the oil. The PCC is then left
11 to absorb the oil. After a suitable amount of time,
12 the PCC is then swept up thereby removing the oil.

13
14 The invention is not limited to the embodiments
15 hereinbefore described which may be varied in both
16 construction and process step without departing from
17 the invention.

18